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TITLE OF THE INVENTION

PROCESS AND DEVICE FOR CONNECTING SMOKING ARTICLES

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PROCESS AND DEVICE FOR CONNECTING SMOKING ARTICLES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority under 35 U.S.C. §119 of European Patent Application No. EP 02 023 524.8, filed on October 22, 2002, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The invention relates to a process for connecting smoking article components with glued connecting sheets fed on a roller with a defined spacing, and a cigarette/tip group fed on a grooved drum. The invention also relates to a device for connecting smoking article components with glued connecting sheets fed on a roller with a defined spacing, and a cigarette/tip group fed on a grooved drum. The invention further relates to a machine of the tobacco processing industry, in particular a filter tipping machine.

[0003] According to the invention, a defined spacing refers to a spacing determined by a predetermined length of the connecting sheets.

2. Discussion of Background Information

[0004] A device for connecting cigarette/tip groups by wrapping with glued connecting sheets is known, e.g., from EP-A-0 687 424, according to which the smoking article components are moved through a rolling channel and thereby turned about their own axis during their forward movement.

[0005] A process and device of the type described above are used in particular in packaging filter cigarettes conveyed in a cross-axial manner on a filter tipping machine. Their capacity regarding the articles produced and discharged per unit time has increased sharply again and again over time or had to be adapted to the increased capacity of the upstream cigarette rod machine. As a partial installation on a filter tipping machine, the roll device mentioned at the outset thereby reaches a critical capacity limit, that, when exceeded, can inevitably lead to a reduction in

quality or increased tobacco wastage, damage, deformation or even destruction of the produced cigarettes.

[0006] Published German patent application no. DE 25 17 209 discloses a device for connecting coating paper strips and cigarette/filter/cigarette groups, in which the coating paper is fed on a grooved drum. During the transfer of the groups to the coating paper feed drum, the coating paper is wrapped around the group.

[0007] Furthermore, a process and a device for connecting smoking articles are described in European Patent No. EP-B-0 821 887. According to the technical teaching, the smoking article components are connected by two consecutive rolling procedures. A first partial rolling occurs in a seat of the grooved drum during and at the transfer of the connecting sheet to a cigarette/tip group. The final rolling is conducted in the form of a multiple rolling of the partially connected components in another process step.

SUMMARY OF THE INVENTION

[0008] The present invention ensures a high product quality of smoking articles, even at higher productive capacities in cigarette production.

[0009] According to the invention, a process of the type mentioned at the outset includes, during the transfer, the connecting sheet is arranged on the cigarette/tip group with two free ends and, in a subsequent step, the connecting sheet is wrapped around the junction points of the cigarette/tip group by rolling the components. The invention is based on the idea that the cigarette/tip group should not change its position on or in the grooved drum, whereby in an intermediate step a partial wrapping of the cigarette/tip group is to take place by the application of a free end of the connecting sheet to the cigarette/tip group. The free length of the connecting sheet is shortened during this, so that the end of the sheet is released from a following cigarette/tip group or is not caught up by it. A complete connection of the cigarette/tip group to the connecting sheet is subsequently made by rolling the components so that the connecting sheet is completely wrapped around the junction points of the cigarette/tip group. Because the connecting sheet

features a leading end on the cigarette/tip group, which end after the transfer is connected to the cigarette/tip group, the spacing between two consecutive, partially connected components can be shortened, since the spacing gap between the rear free end of the connecting sheet and the following cigarette/tip group is enlarged. This spacing gap can subsequently be shortened, so that a filter tipping machine can be operated at a higher productive capacity.

[0010] The leading free end of the connecting sheet can be glued or partially connected to the cigarette/tip group, if the connecting sheet is arranged asymmetrically on the cigarette/tip group. In this connection, the feed of the coating paper strip takes place with a smooth feed drum.

[0011] A reliable partial wrapping of the cigarette/tip group is achieved when, after the arrangement of the connecting sheet on the cigarette/tip group, the connecting sheet and the cigarette/tip group are partially connected by applying a free end of the connecting sheet. This occurs in a process step after the arrangement of the connecting sheet on the cigarette/tip group. The free end of the connecting sheet in front in the conveying direction of the cigarette/tip group is preferably applied to the cigarette/tip group.

[0012] The free end of the connecting sheet is preferably applied to the cigarette/tip group by an application device.

[0013] Moreover, it is advantageous if the spacing between the partially connected components is reduced. After the connection of the partially connected components and the partial wrapping, the spacing between the trailing free end of the connecting sheet and the following, likewise partially wrapped cigarette/tip group is larger than with cigarette/tip groups in which the sheet is attached at a point according to the prior art. With the reduction of the spacing according to the invention, e.g., through moveable arms of a grooved drum, the conveyors arranged downstream of the grooved drum can likewise be operated with a smaller spacing, so that overall the productivity of a machine is increased with a high product quality. Thus, more cigarettes per minute can be transported or produced in a

machine through the change or reduction of the spacing. At the same time, the smoking article components are handled gently.

[0014] It is particularly advantageous if the spacing of the seats of the grooved drum is reduced after the partial connection of the components. The reduction of the spacing is based on the idea that the spacing gap between the trailing free end and the following, likewise partially wrapped group is enlarged through the application of the leading free end of the connecting sheet to the cigarette/tip group. Through the larger spacing gap it is possible to reduce the spacing to the following devices or conveyor drums, so that a filter tipping machine is operated with a higher throughput of produced cigarettes. Through the reduction of the spacing of the partially wrapped objects, the transfer of the partially connected smoking article components can subsequently take place on a transfer drum with a smaller spacing.

[0015] According to an advantageous further development of the process, after being partially connected, the partially connected components are transferred to a drum, in particular with a reduced spacing corresponding to the spacing of the grooved drum. As a result, e.g., a filter assembler can be operated with a smaller spacing after the transfer of the components from a rod unit.

[0016] In order to join the smoking article components securely, it is provided according to the invention for the connecting sheets and the cigarette/tip groups to be joined with the same spacing.

[0017] If the spacing between the partially connected components is changed, it is necessary for the spacing of the seats of the grooved drum to be increased after the transfer of the partially connected components. The adjustment of the reduced spacing to the original spacing guarantees a reliable operation of the process or of a device.

[001°] A secure adhesive connection between the smoking article components is ensured by a rolling being carried out after the transfer of the partially connected components to the drum.

[0019] In particular, it is advantageous if the final rolling is carried out in the form of a multiple rolling of the components.

[0020] The present invention is directed to a device of the type mentioned at the outset, which is embodied or formed to arrange the connecting sheet with two free ends on the cigarette/tip group.

[0021] In order to provide the cigarette/tip group with a partial wrapping of the free leading end with the connecting sheet according to the invention, a device for partially connecting the components by applying a free end of the connecting sheet, in particular the free end in front in the conveying direction, to the cigarette/tip group is provided. Through the asymmetrical arrangement of the connecting sheet on the cigarette/tip group, the free leading piece of the connecting sheet is pressed to the cigarette/tip group and connected to it. The rear free part of the connecting sheet forms a kind of little tag.

[0022] According to an advantageous further development, it is provided that the device for partial connection of the components is arranged between the roller and a transfer drum relative to the conveying direction of the grooved drum.

[0023] In particular, the device for partial connection is embodied as a rotational body and/or application device.

[0024] The free end of the connecting sheet is applied to the cigarette/tip group without creasing if the device for partial connection features at least one application element, preferably a projection.

[0025] The application elements preferably feature the same spacing of the seats of the grooved drum during the arrangement of the connecting sheet.

[0026] Furthermore, it is advantageous if the seats of the grooved drum can be changed with respect to the spacing. In this manner, the partially connected components can be transferred to a transfer drum with a smaller spacing.

[0027] It is advantageous if at least one rolling station is provided for wrapping the connecting sheet around the junction points of the cigarette/tip group. The rolling station can be realized by, e.g., a rolling block, as shown, e.g., in DT-PS 16

32 193 or, alternatively, by a rolling channel embodied or formed by belts, as shown in DE-A-198 57 576.

[0028] The invention is further directed to a machine of the tobacco processing industry, in particular a filter tipping machine, that includes the above described device.

[0029] A consistent or possibly even reduced article strain during the production process is achieved by the invention with a desired and achieved higher output rate and thus production rate of the filter cigarette lines. Moreover, a reduction in speed and a resulting noise reduction can be achieved through the invention, so that overall the efficiency of a filter tipping machine can be increased.

[0030] The present invention is directed to a process for connecting smoking article components. The process includes feeding a glued connecting sheet on a roller, feeding a cigarette/tip group on a grooved drum, transferring the connecting sheet to the cigarette/tip group such that the connecting sheet is arranged on the cigarette/tip group with two free ends, and rolling the cigarette/tip group to wrap the connecting sheet around the cigarette/tip group.

[0031] According to the instant invention, the connecting sheet can be transferred onto a junction point of the cigarette/tip group.

[0032] Further, the roller can feed a plurality of glued connecting sheets that are positioned with a defined spacing and the grooved drum can feed a plurality of cigarette/tip groups. The process may further include rotating the roller and the grooved drum such that a respective connecting sheet is successively transferred to a respective cigarette/tip group.

[0033] In accordance with a feature of the invention, the connecting sheet may be transferred to located asymmetrically on the cigarette/tip group.

[0034] Moreover, after transferring the connecting sheet to the cigarette/tip group, the process can also include applying one of the two free ends of the connecting sheet to the cigarette/tip group to form partially connected components. The one of the two free ends can be the front free end viewed in a

conveying direction of the cigarette/tip group. The free end of the connecting sheet can be applied by an application device. The process may also include reducing a spacing between the partially connected components. The grooved drum can include seats and the cigarette/tip group may be located in one of the seats, and the spacing between the partially connected components can be reduced by reducing a spacing between the seats of the grooved drum. The process further may include transferring the partially connected components to a drum. The partially connected components can be transferred to the drum at a spacing corresponding to the reduced spacing of the seats of the grooved drum.

[0035] According to still another feature of the invention, the roller can feed a plurality of glued connecting sheets and the grooved drum can feed a plurality of cigarette/tip groups, and the connecting sheets and the cigarette/tip groups may be joined at a same spacing.

[0036] Still further, after the transfer of the partially connected components to the drum, the process can include increasing the spacing between the seats of the grooved drum. Moreover, after the transfer of the partially connected components to the drum, the rolling of the cigarette/tip group can be a rolling of the partially connected components. The rolling may be performed as a multiple rolling of the partially connected components.

[0037] The present invention is directed to a device for connecting smoking article components. The device includes a roller structured and arranged to a feed glued connecting sheet and a grooved drum structured and arranged to feed a cigarette/tip group. The roller and the grooved drum are structured and arranged to connect the connecting sheet to the cigarette/tip group in such a manner that the connecting sheet has two free ends when connected to the cigarette/tip group.

[0038] In accordance with the invention, the roller can be structured and arranged to feed a plurality of connecting sheets with a defined spacing.

[0039] The device can also include a device for applying one of the two free ends of the connecting sheet to the cigarette/tip group to form partially connected

components. The applying device may be arranged to apply a first free end of the connecting sheet, when viewed in the conveying direction of the grooved drum. The device can further include a transfer drum. The applying device can be located between the roller and the transfer drum relative to the conveying direction of the grooved drum. The applying device can include a rotational body. Further, the applying device may include at least one application element. The application element may include a projection. The grooved drum can include a plurality of seats, and the application elements may be spaced to correspond to a spacing between the plurality of seats during the connection of the connecting sheets to the cigarette groups. Further, the spacing between the plurality of seats can be changeable. Still further, the device can include a device for changing the spacing between the plurality of seats. Moreover, the application element can be rotatable so that the at least one application element contacts the one free end.

[0040] In accordance with another feature of the invention, the device can also include at least one rolling station located to wrap the connecting sheet around a junction point of the cigarette/tip group.

[0041] Still further, the invention is directed to a machine of the tobacco processing industry comprising the device described above. The machine can be a filter tipping machine.

[0042] The instant invention is directed to a process for connecting smoking article components. The process includes feeding glued connecting sheets on a roller, feeding cigarette/tip groups on a grooved drum, in which each cigarette/tip group has a longitudinal axis, and connecting the connecting sheets to the cigarette/tip groups without rotating the cigarette/tip groups about their longitudinal axes.

[0043] In accordance with still yet another feature of the present invention, the connecting sheets can be connected to the cigarette/tip groups in such a manner that the connected connecting sheets have two free ends. The process can also include applying first free ends of the two free ends, when viewed in the

cigarette/tip group conveying direction, to the cigarette/tip groups without rotating the cigarette/tip groups about their longitudinal axes, thereby forming partially connected components. The process can further include applying the second free ends of the two free ends, when viewed in the conveying direction, to the cigarette/tip groups by rotating the cigarette/tip groups about their longitudinal axes.

[0044] Other exemplary embodiments and advantages of the present invention may be ascertained by reviewing the present disclosure and the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0045] The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0046] Figure 1 illustrates a sectional view of a drum arrangement of a filter tipping machine; and

[0047] Figure 2 diagrammatically illustrates a sectional view of the partial wrapping of smoking article components.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0048] The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

[0049] Figure 1 illustrates diagrammatically, in section, a device 30 according to the invention with a plurality of drums, as embodied or formed, e.g., in a filter tipping machine. The conveyors of device 30 involved in the processes according to the invention comprise a suction roller 2 rotating in the direction of arrow 1, on which connecting sheets 3 are fed at a defined spacing that is predetermined by the length of connecting sheet 3. moreover, connecting sheets 3 are glued on their outside surface, i.e., facing away from suction roll 2. Connecting sheets 3 are arranged on carrier brackets 28 of suction roller 2, and held in carrier brackets 28 by suction through vacuum intake openings 12.

[0050] Another conveyor of device 30 involved is embodied or formed as a grooved drum 6 that rotates in the direction of arrow 7 that is equipped with drum grooves 8 on moveable groove arms. An example of such a transfer device with moveable arms for rod-shaped articles is disclosed, e.g., in DE-B-31 37 223.

[0051] Drum grooves 8 each accept one cigarette/tip group 9 and hold cigarette-tip groups 9 on conveyor drum 6 by a vacuum applied through suction borings 11.

[0052] During the transfer of connecting sheet 3 to cigarette/tip groups 9, connecting sheets 3 and drum grooves 8 feature the same spacing.

[0053] The connecting sheets 3 and the cigarette/tip group 9 are moved towards one another and joined via the synchronous rotation of the suction roller 2 and the grooved drum 6. During the joining of a connecting sheet 3 to a cigarette/tip group 9, connecting sheet 3 is adhered asymmetrically, e.g., with a front free end 4 and a rear free end 5 to cigarette/tip group 9. Subsequently, the adhered connecting sheet 3 with respective cigarette/tip group 9 is moved away from suction roller 2 toward a transfer drum 18. The combination of connecting sheet 3 and cigarette/tip group 9 is thereby moved along a sheet guide 24, which prevents sheet 3 from separating from cigarette/tip group 9.

[0054] Subsequently, cigarette/tip group 9 with connecting sheet 3 is fed along sheet guide 24 to a rolling star 25, which is a rotating body that features projections 27 on the outside arranged in a star-shaped manner. The spacing of

projections 27 of rolling star 25 corresponds to the spacing of drum grooves 8 on grooved drum 6 or the spacing of carrier brackets 28 of suction roller 2. In order to conduct a partial wrapping of cigarette/tip group 9 with leading end 4 of connecting sheet 3, projection 27 touches front end 4 of connecting sheet 3 and thus applies front end 4 onto cigarette/tip group 9. Moreover, the rotating movement of rolling star 25 is synchronized with the rotating movement of grooved drum 6. During the partial wrapping, rear free end 5 of connecting sheet 3 does not change its relative position to cigarette/tip group 9. After the partial wrapping or partial connection of the components, i.e., connecting sheet 3 and cigarette/tip group 9, at rolling star 25, the spacing between drum seats 8 is reduced, so that, during the transfer of the partially connected smoking article components 3 and 9 to roller drum 18, drum seats 8 feature a reduced spacing as compared to the spacing of the carrier brackets 28 of suction roll 2. After the transfer of the partially connected components 3 and 9 to roller drum 18, the spacing between drum seats 8 is enlarged again so that the spacing of seats 8 on grooved drum 6 again corresponds to the spacing of connecting sheets 3, as well as to the spacing of carrier brackets 28 on suction roller 2.

[0055] Roller drum 18 transfers the partially wrapped combination of connecting sheet 3 and cigarette/tip group 9 in the direction of arrow 19 to a rolling station (not shown), at which a rolling channel is formed, e.g., between a rolling block and the outer circumference of roller drum 18. The rolling surface of the rolling block is substantially longer than the circumferential surface of the cigarette/tip groups 9 so that as cigarette/tip group 9 is rolled several times, connecting sheet 3 is completely connected to cigarette/tip group 9. Alternatively, the rolling can be carried out by belts instead of a rolling block, as disclosed in, e.g., DE-A-198 57 576.

[0056] Figure 2 illustrates in detail the application of front free end 4 of connecting sheet 3 to cigarette/tip group 9 by rolling star 25. Rolling star 25 has a projection 27 that approaches cigarette/tip group 9 during the synchronous rotation

of rolling star 25 and grooved drum 6, with respect to the conveying direction of drum 6, until projection 27 touches front end 4 of connecting sheet 3 in order to press it onto cigarette/tip group 9. Rear free end 5 of connecting sheet 3 which rests on (and is supported by) a (rearward) mandrel 14 of seat 8, remains constant in its length during this partial connection.

[0057] It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

List of Reference Numbers

1	Arrow
2	Suction roller
3	Connecting sheet
4	Free end
5	Free end
6	Grooved drum
7	Arrow
8	Drum seat
9	Cigarette/tip group
11	Vacuum intake boring
12	Vacuum intake opening
14	Support mandrel
18	Roller drum
19	Arrow
24	Sheet guide
25	Rolling star
27	Projection
28	Carrier brackets
30	Device